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notes on *Puntius arulius* (Jerdon).

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NEW FISHES FROM THE WESTERN GHATS, WITH NOTES ON *PUNTIVUS ARULIVUS* (JERDON).

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(From the Laboratories of the Zoological Survey of India, Calcutta.)

INTRODUCTION.

In September 1949, an Entomological Survey of a part of the Western Ghats of Tinnevely District, Madras State, commonly known as the "Singampatty Range" was conducted by a party of students, including the writer, under the leadership of Professor J. P. Joshua of the Madras Christian College. This hill range lies about $8^{\circ}60'N$ and $77^{\circ}40'E$, and is roughly about 35 miles to the west of Tinnevely proper. The general elevation is about 4,000 feet above sea level and, except for a few Cardamom and Tea Plantations, the hills are thickly forested. Being soon after the close of the monsoon, the time selected was best suited for the collection of forest insects. With the permission of his professor and with the help of some of his fellow students, the writer was able to make a small collection of fish from the head-waters of the Tambraparni River, which drains the eastern face of this hill range. Also a second collection was made from a small stream (Tambraparni watershed) at the base of these hills, about seven miles off the town of Kalladakurichi. A perusal of the literature showed that there existed no record of fishes having been reported from this area. The entire material collected from the streams of the Singampatty Range, along with duplicate specimens of the different species obtained from the stream at the base of the Ghats, was brought by the writer to Calcutta, while the remaining specimens from the latter locality are to be found in the Museum of Zoology, Madras Christian College. Although small, the collection is very interesting, as it includes a hitherto undescribed species of Cyprinid fish, which differs so greatly from the known genera of the family Cyprinidae, that a new genus, *Horlabiosa* is proposed for its reception. In addition, the collection also includes a number of specimens of a new subspecies of *Puntius arulivus* (Jerdon), a tiny coloured carp. Most of the remaining species in the collection have a wide distribution and hence need no special remarks. The list of species, the number of specimens in the collection and the localities from which they were obtained are given in the following table.

Table I.

Name of Species.	No. of specimens.	Streams close to Singampatty.	Stream at base of Ghats.
Family CYPRINIDAE.			
Subfamily RASBORINAE.			
1. <i>Rasbora daniconius</i> (Hamilton) . . .	27	X	X
2. <i>Danio aequipinnatus</i> (McClelland) . . .	5	...	X
Subfamily CYPRININAE.			
3. <i>Puntius arulius</i> sub-sp. <i>tambraparniei</i> nov.	14	...	X
4. <i>Puntius amphibius</i> (Valenciennes)	3	...	X
5. <i>Puntius ticto</i> Hamilton	22	...	X
6. <i>Horabiosia joshuai</i> gen. et sp. nov.	13	X	...
Subfamily GARRINAE.			
7. <i>Garra lamta</i> Hamilton	31	X	...
Family GOBIIDAE.			
8. <i>Glossogobius giuris</i> (Hamilton)	1	...	X
Family OPHIOCEPHALIDAE.			
9. <i>Channa gachua</i> (Hamilton)	2	...	X

Horabiosia*, gen. nov.

The genus *Horabiosia* is created for the reception of small hill stream fishes in which the body is moderately elongate, slightly compressed, but more depressed anteriorly. The dorsal profile abruptly rises from the tip of the snout to above the anterior margin of the orbit, from whence it is more or less straight upto the commencement of the dorsal fin and then gently slopes to the base of the caudal fin. The ventral surface is flattened and the paired fins are more or less horizontally inserted. The snout is bluntly rounded and smooth without any trace of tubercles. The lips are moderately developed and fleshy, and are continuous at the angles. A deep and well defined rostral groove separates the upper lip from the rostrum. The free edge of the rostral fold is entire or minutely fringed. The lower lip is closely adnate to the lower jaw.

* The writer has great pleasure in naming this new genus after Dr. S. L. Hora, in token of his extensive work on the freshwater fishes of India.

There is no symphysial knob, and the post-labial groove is broadly interrupted in the middle. In the mental region, a minutely and sparsely papillated post-labial callous structure is present. This callous portion which resembles a thickened fleshy pad, is rectangular, slightly elevated and is anteriorly confluent with the lower lip at the symphysis. Its posterior margin is either straight or slightly lobed. The rostral and maxillary pairs of barbels are well developed. The eyes are of moderate size with free orbital margins. The gill-openings are wide, slightly oblique and extend to the ventral surface for a short distance. The gill membranes are joined to the isthmus. The gill-rakers are short and few in number. The pharyngeal teeth are biserially placed, the formula being, 4.3—3.4. The branchiostegials number three on either side. The scales are fairly large and present in moderate numbers. The lateral line is complete and runs along the side of the body to the middle of the base of the caudal fin. The origin of the dorsal fin is slightly in advance of that of the pelvic fins and the number of rays in it is moderate, the last undivided ray being non-osseous, weak, smooth and articulated. The anal rays are few in number.

Genotype.—*Horabiosia joshuai*, gen et sp. nov.

Distribution.—Peninsular India (Headwaters of Tambraparni River at Singampatti, Singampatty Range, Tinnevelly District, Madras State).

Relationships of the new genus.—Smith (1945) observed "the coalescence of the upper lip with the skin to the rostrum" to be the most outstanding character of the subfamily Garrinae, which he named after the oldest genus constituting the group, viz., *Garra* Hamilton. Thus defined, the subfamily will also include genera like *Crossocheilus* van Hasselt, *Parapsilorhynchus* Hora, *Epalzeorhynchus* Bleeker, etc. The new genus *Horabiosia* differs from the above group, in the possession of a well defined rostral groove separating the upper lip from the rostrum, the size and disposition of the barbels, etc. Though in the possession of the callous post-labial pad, it shows some similarity to *Garra*, it is likely that this has been brought about by convergence. Further, the nature of the food and the length of the gut in relation to the body length in these two genera brings out another difference. As it is now known that the length of the gut of a species may vary according to the nature of the food taken in, even at different stages during growth, a number of specimens of the new genus measuring 37 to 50 mm. in length, as well as specimens of the same length of *Garra lamta* collected along with the former, from the same localities, at the same time, were examined and it is found that while in *Horabiosia joshuai*, the length of the gut varies from .75 to 1.2 times the total length of the specimens; in *Garra lamta*, it ranges from 2.75 to well over 3 times the total length of the specimens. The gut contents show that the former is an omnivorous feeder, while *G. lamta* feed on vegetable matter, especially algae. *Horabiosia*, is no doubt a true Cyprinine fish, but the post-labial callous pad, the pharyngeal dentition, the lepidosis, etc., help in easily distinguishing it from other genera of the subfamily Cyprininae.

Horallabiosa joshuai,* gen. et. sp. nov.

Br. iii. D. 3/7; P. 1/13; V. 1/8; A. 3/5; C. 19; L. I. 33 (31-33)**

The body is moderately elongate and slightly compressed, its greatest height, which is below the commencement of the dorsal fin, is 7.06 (6.0-6.9) times in the total length and 5.33 (4.5-5.1) in the standard length. The head is rather small, bluntly rounded anteriorly and somewhat depressed; its length is 5.3 (4.44-5.42) times in the total length and 4 (3.3-4) in the standard length. The height of the head at occiput is slightly less than its width, it being contained 1.14 (1.0-1.2), in the latter and is 1.4 (1.3-1.7) in its length. The caudal peduncle is little longer than high; its least height being 1.4 (1.2-1.5) in its length.

The eye is of moderate size, but comparatively larger in young examples; its diameter is contained 4 (3.5-4.5) times in the length of the head. It is placed nearer the dorsal profile than the ventral and is almost entirely in the anterior half of the head. The inter-orbital space is more or less flat and is 1.9 (1.8-2.0) times the diameter of the eye.

The snout is bluntly rounded and has no free lateral lobes or tubercles. A few minute sensory pores are present on it. The snout is 1.6 (1.3-1.7) times as long as the diameter of the eye. The mouth is subinferior and slightly curved, the cleft being nearly horizontal and does not reach below the anterior border of the eye. A well developed rostral groove is present separating the upper lip from the rostrum. The lips are moderately developed, and are thick and fleshy at the angles of the mouth where they are continuous and minutely papillated. The lips are closely adnate to the jaws, and the upper jaw is slightly the longer. The post-labial groove is interrupted in the middle.

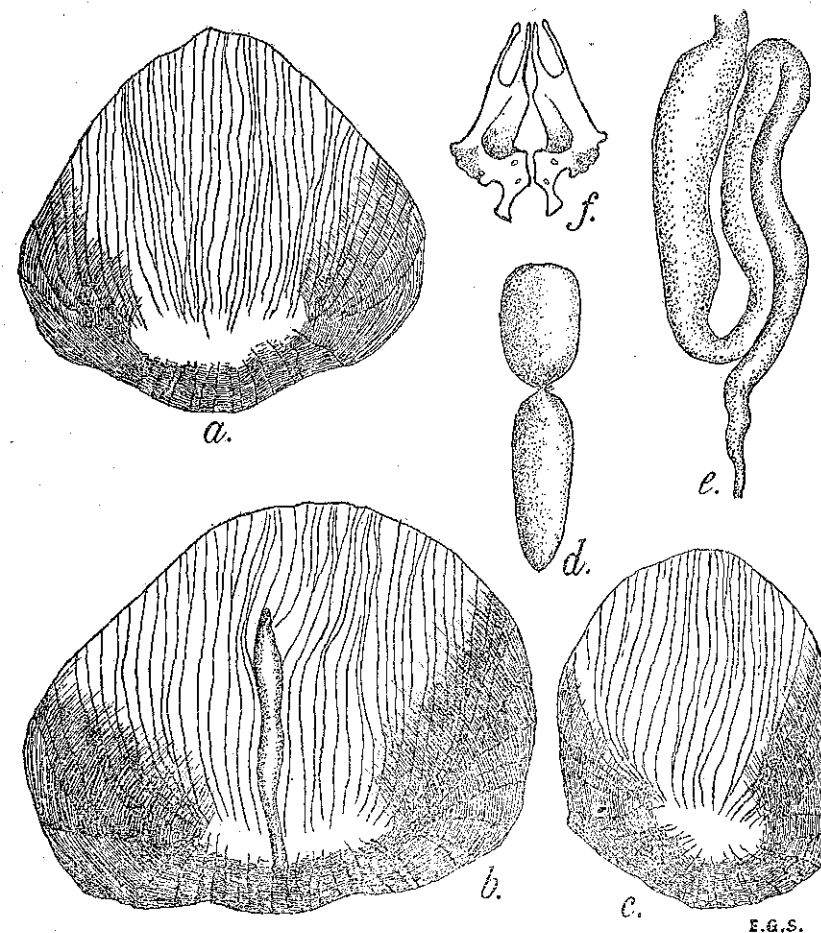
A post-labial callous pad (not a suctional disc as in *Garra* or an incipient disc or knob as in *Parapsilorhynchus* Hora, *Crossocheilus* van Hasselt, etc.) is present. It extends to almost half the distance between the anterior end of the lower jaw and the isthmus. Anteriorly it is confluent with the lower lip at the symphysis, while posteriorly its margin is either straight or slightly lobed and not free. The surface of the fleshy pad is minutely and sparsely papillated.

The rostral and maxillary pair of barbels are well developed. The former is as long as, or a little less than the diameter of the eye, while the latter is much longer than the diameter of the eye. The rostral barbel does not reach upto the anterior border of the orbit; the maxillary extends to beneath its posterior margin.

* This species is named after my former professor, Dr. J. P. Joshua of the Madras Christian College.

** In the description of the species, the scale counts and measurements of the holotype measuring 53 mm. is given. These are followed within brackets by the range of variation, if any, shown by the paratypes.

The gill-rakers are few, numbering from 8 to 14 and are very short and stumpy, hardly being one-sixth the length of the longest gill filament. The pharyngeal bone is about one fourth as wide as long. Its anterior



TEXT-FIG. 1. *Horallabiosa joshuai* gen. et sp. nov.

- a. Scale from side of body below dorsal fin $\times 22$.
- b. Scale from lateral line below dorsal fin $\times 22$.
- c. Scale from caudal peduncle $\times 22$.
- d. Air-bladder $\times 3$.
- e. Alimentary canal $\times 4$.
- f. Basipterygium $\times 4$.

edentulous process is fairly long and the pitted surface is not very broad. The teeth are compressed and hooked and are placed in two rows, the formula being, 4-3-3-4.

The scales are of moderate size, the largest being those found along the lateral line, which are slightly longer than the diameter of the eye. They have generally a wavy basal margin. The nucleus is basal and the circuli are absent in the apical region. The apical radii are numerous,

run more or less parallel, and almost all of them reach the nucleus. A few lateral and a number of basal radii are present in the scales, especially in those on the sides of the body and on the caudal peduncle. There are $1\frac{1}{2}$ ($1\frac{1}{2}$ —2) rows of scales between the lateral line and the base of the pelvic fin. Twelve rows of scales are present round the caudal peduncle. The predorsal scales number 12 (11-12), while the scales along the lateral line are 33 (31-33). Scales are absent on the ventral surface inbetween the bases of the pectoral fins and in front of it.

The origin of the dorsal fin is slightly in advance of the pelvic fins and is midway between the tip of the snout and the base of the caudal fin. It is shorter than the head, its length being contained 1.1 (1.1—1.35) in the latter. The last undivided dorsal ray is nonosseous, smooth, weak and articulated. The free margin of the dorsal fin is slightly concave. The paired fins are broad, rounded and more or less horizontally inserted. The pectoral fin is almost as long as the head, but if adpressed, have the tips slightly remote from the insertion of the pelvic fin. Similarly the pelvic fins are also separated from the anal fin by a short distance. The anal fin has a more or less obliquely truncated free margin. The caudal fin is deeply forked, its lower lobe being slightly the longer.

The air-bladder is bipartate, a condition which is typical of the Cyprinidae. Lateral horns are present in the basipterygium. The alimentary canal is short and is 0.75 to 1.2 times the total length of the body and in a few specimens dissected contained both vegetable matter as well as remains of aquatic insects. The gonads are developed in specimens measuring 50 mm. and more.

The colour in spirit is dull brownish grey dorsally and somewhat lighter beneath. In very young specimens, a faint dark spot is present at the base of the caudal fin. The fins are dirty white in colour. A dark brown spot may or may not be present at the upper angle of the gill opening.

Type specimen.—The Holotype No. F. 734/2 and twelve of the paratypes (No. F. 736/2), are deposited in the collection of the Zoological Survey of India, Indian Museum, Calcutta.

Type locality.—Headwaters of the Tambraparni River at Singampatty, Singampatty Range, Tinnevely District, Madras State.

Measurement in millimeters of the Holotype marked with an astrisk and nine of the paratypes is given in the following table:—

Table II.

Total Length	53*	60	65	40	44	45	41	39	37	39
Length of Caudal fin.	13	15	16	10	10	10	10	10	10	10
Length of Head	10	12	13	9	9	9	8.5	8	7	7
Length of snout	4	5	5	3	3	3	3	3	2.75	3
Height of head at occiput.	7	8	8	6	6	6	6	6	5	5

Table II—contd.

Width of head	8	9	9	6	6.5	6.75	6.5	6	5.5	6
Diameter of Eye	2.5	3	3	2	2	2	2	2	2	2
Inter-orbital width	4.75	6	6	4	4	4	4	4	3.75	4
Height of body	7.5	10	10	6	7	7	6	6	6	6
Length of caudal peduncle.	7	8	8	6	6	6	6	6	5.5	6
Least height of caudal peduncle.	5	5.5	6	4.5	4.75	5	5	4.5	4	5
Length of dorsal fin.	9	10	12	7	7	7	6.5	6	6	6
Length of pectoral fin.	11	11	13	8	8	8	8	7	6	7
Length of pelvic fin.	9	10	10	6.5	7	7	6.5	6	5	5
Length of anal fin.	8	8	9	5	6	6	6	5	5	5

***Puntius arulius* (Jerdon).**

Systemus arulius, Jerdon, *Madras Journ. Litt. & Sci.* XV, p. 317 (1849).

Barbus arulius, (in part), Gunther, *Catal. Fish. British Mus.*, VII, p. 133 (1868).

Barbus arulius, Day, *Fish. India*, p. 575, pl. cxlii, fig. 5 (1878).

Barbus arulius, Day, *Fauna Brit. India. Fish.* I, p. 322 (1889).

Barbus arulius, Jenkins, *Rec. Ind. Mus.*, III, p. 289 (1909).

Barbus arulius, Mukerji, *Journ. Bombay Nat. Hist. Soc.*, XXXV, p. 163 (1932).

Jerdon (1849), characterised his new species *Systemus arulius* as:

"Head $3\frac{1}{2}$ times in length; depth $2\frac{1}{2}$ times in the same; eye large; 20 scales along the sides in 6 rows D. 10. A. 7 green above, silvery beneath; a large diffused black spot on side beneath the commencement of the dorsal, another over the anal, and another at the base of the caudal; dorsal, caudal and anal fins red; P. and V. colourless; in older subjects the spots extend to more over the sides; length 4 inches.

Found in the Cauvery, called *aruli* at Seringapatam."

Unfortunately Jerdon never figured any of the species he described from South India, but all the same his diagnosis of the species is clear enough to refer it at present to the genus *Puntius* Hamilton. The specific diagnosis, however, does not seem to be quite adequate to distinguish it from other coloured species of *Puntius*. Day (1878) who described the species under the genus *Barbus* Cuvier gave a more detailed diagnosis of it, and observed the colour of the species to be:

"olive-green on the back, becoming silvery white dashed with reddish green over the abdomen. A black blotch, about two scales in width, passes from below the origin of the dorsal fin as low as the lateral line; a second from just below the posterior extremity of the dorsal to the base of the anal; and a third across the free portion of the tail before the caudal fin. Dorsal, caudal and anal pinkish with a black bar across the submit of the first, whilst the caudal is stained at its edges."

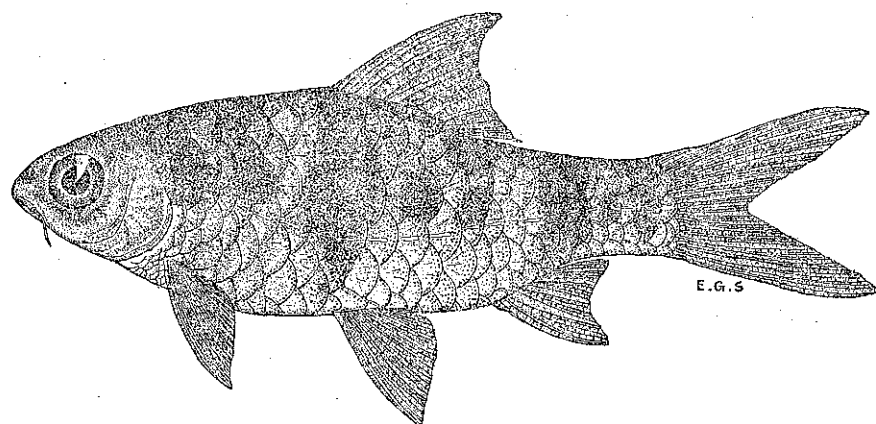
Mukerji (1932) redescribed *Puntius arulius* from more material and gave its colour as, "...general body colouration is olivaceous green. The portion above the lateral line is blackish. There are three black blotches on the sides of the body". All the seven specimens of

P. arulius listed by Mukerji (*op. cit.*) as present in the fish collection of the Zoological Survey of India (including original of Day's figure 5, pl. cxlii in *Fishes of India*), have been examined and it is found that six of them, viz., Nos. 2732, F. 2555/1, F. 2566/1, F. 8069/1 and F. 11139/1, agree in all details with Mukerji's redescription of the species. But one specimen, labelled as purchased from Dr. Day, (F. 5535, locality : Nilgiris), though listed along with *P. arulius* is in fact a specimen of *Puntius melanampyx* Day. An examination of these specimens and a critical study of all the previous descriptions of *P. arulius*, clearly shows that the coloured specimens of *Puntius* in the writers collection, though showing affinities to *P. arulius*, differs from it very greatly in body colouration. However, until more specimens of *P. arulius* are examined to ascertain morphometric variations, the specimens from Tambraparni river are described here as only a new subspecies of *P. arulius*.

***Puntius arulius* sub-sp. *tambraparniei* nov.**

D. 11-12 (3/8-9); P. 14-15; V. 9; A. 7 (2/5); C. 18-19; L. 1. 21-23; L. tr. $2\frac{1}{2}$ -1-4 $\frac{1}{2}$.

Head 3 to 4 in standard and 4 to 5.3 in total length; length of caudal 2.68 to 3.88 and 3.68 to 5; and depth of body 2.59 to 4 and 3.4 to 5.6. Snout 2.6 to 4 in length of head; width of head 1.6 to 2 and height of head at occiput 1.18 to 1.6 in its length. Diameter of eye 2.66 to

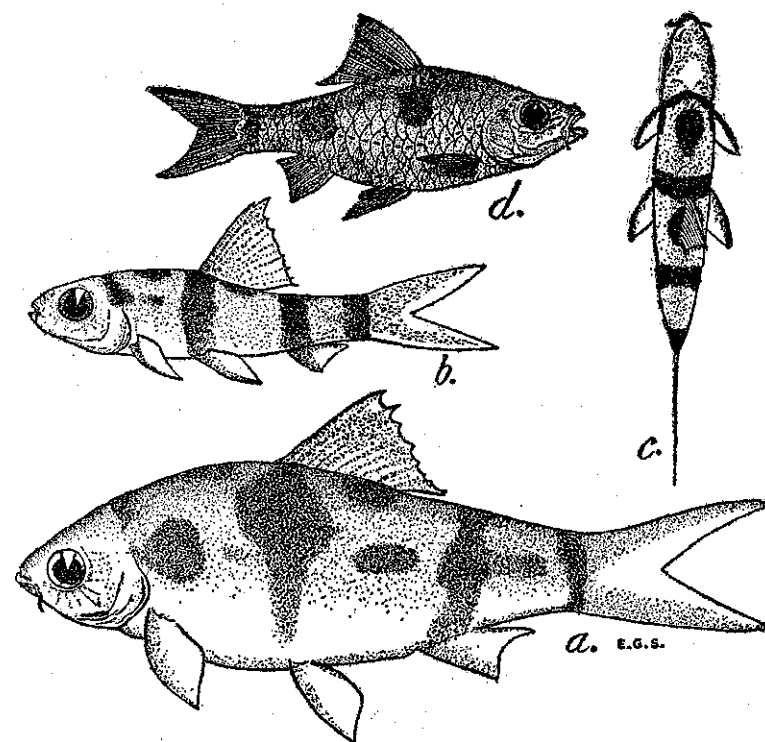


TEXT-FIG. 2. *Puntius arulius* sub sp. *tambraparniei* nov. Lateral View.

3.75 in head; 0.66 to 1.25 in snout and 1.0 to 1.4 in interorbital width. Distance between tip of snout and origin of dorsal contained 1.0 to 1.2 in distance between origin of dorsal and base of caudal fin. Least height of caudal peduncle contained 1.16 to 1.66 in its length. Longest dorsal ray 0.95 to 1.64 in height of body below origin of dorsal. Length of pectoral fin 1.06 to 1.5 in length of head. A pair of well developed maxillary barbels present. Upper jaw slightly over-hanging lower; post-labial groove interrupted; last simple dorsal ray non-osseous and weak. Caudal deeply emarginate. Lateral line complete with 21 to 23

scales; $2\frac{1}{2}$ rows of scales between it and base of pelvic fin. Predorsal scales 7 or 8. Colouration and secondary sexual characters of the new subspecies are given below.

As in the case of other coloured species of *Puntius* (Silas, 1953), the new subspecies, also exhibits a certain amount of variations in its colour pattern at different stages during growth, as well as during the breeding



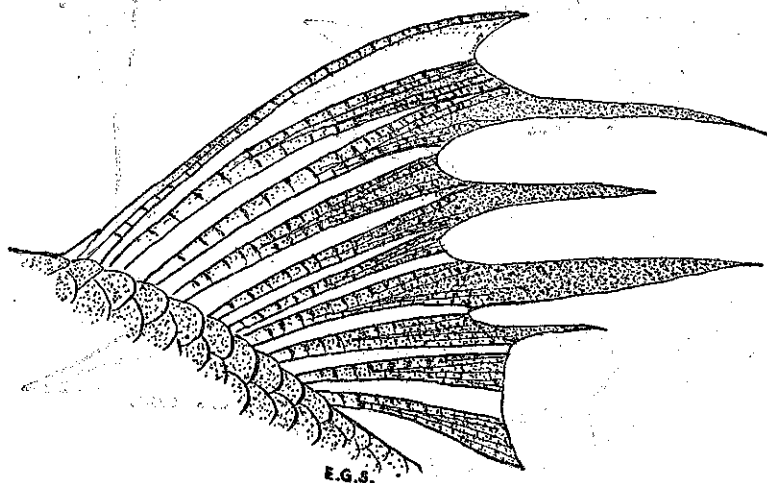
TEXT-FIG. 3. *Puntius arulius* sub. sp. *tambraparniei*, nov.

- a. Lateral view of specimen measuring 84 mm. $\times 2\frac{1}{2}$.
- b. Lateral view of specimen measuring 31 mm. $\times 2$.
- c. Same as viewed from dorsally $\times 2$.
- d. *Puntius arulius* after Day 1878, pl. cxlii, fig. 5.

season. In very small specimens, ranging from 22 to 30 mm. in length there are three vertical blotches or 'bands' on the side of the body; the first being just below the commencement of the dorsal fin, and, extending as low as the base of the pelvic fin; the second from below the posterior extremity of the dorsal fin and extending to the base of the anal fin and a third across the base of the caudal fin. In still larger specimens ranging from 31 to 49 mm. in length, in addition to these vertical blotches or 'bands' which coalesce with those of the opposite side dorsally, a few more blotches are present (Text-fig. 3 b, c). One is situated above the upper angle of the gill opening and extends dorsally, becoming confluent with that of the opposite side in the region of the occiput. Two other blotches are present on the dorso-median line, the first between the commencement of the dorsal and the occiput,

and the second extending over the posterior two-thirds of the base of dorsal fin. The outer rays of the fins are stained dark, but the inner portion is pinkish. Further, a few pigment spots are present behind and above the gill openings, which in larger specimens ranging from 50 to 92 mm. (Text-fig. 3 a), is well defined and takes the form of a dark blotch. The large specimens also exhibit another blotch on the lateral line anterior to the commencement of the anal fin, and a second one on the lateral line between the base of the caudal and the hind end of the anal fin. This latter blotch may sometimes be confluent anteriorly with the vertical blotch above the anal fin. The fins are pinkish, but the outer half of the rays are generally coloured dark.

The new subspecies also exhibits certain secondary sexual characters. In one of the two specimens of it given recently to the writer by Mr. P. I. Chacko (collected from the Tambraparni river), a few of the branched rays in the dorsal fin are drawn into filamentous prolongations (Text-fig. 4).



TEXT-FIG. 4. *Puntius arulius* sub. sp. *tambraparniei* nov. Figure showing the filamentous prolongation of the dorsal fin in a sexually mature male specimen $\times 4\frac{1}{2}$.

A few tubercles are also present on the snout of this specimen, while both these characters are absent in the second specimen and others in the writer's collection. Dissection of the first two specimens which measure 71 and 69 mm. respectively and others in the collection showed that the larger specimen with tubercles on the snout and a few of the dorsal fin rays produced into filamentous prolongations is a male, while those lacking these characters are female specimens. These characters in the male are no doubt secondary sexual characters as is seen in the case in other species of *Puntius*, such as *P. filamentosus*, *P. melanampyx*, etc.

Type specimen.—No. 735/2. The Holotype and the paratypes, No. 735/2 are deposited in the collection of the Zoological Survey of India, Calcutta.

Type Locality.—Stream 7 miles off the town of Kalladaikurich, on the road to Singampatty (Tambraparni watershed), Tinnevely District, Madras State.

Note.—Jerdon described *Systemus arulius* from the river Cauvery and Day (*op. cit.*) gave the distribution of the species as:

"Wynaad and Nilgiri range of hills and the rivers at their bases, and at least as far south as Kotayam in Travancore, also in the Cauvery, from whence this fish has been procured at Seringapatam where it is termed *Aruli*".

P. arulius is no doubt common in the middle and upper reaches of the river Cauvery and further south in the Tambraparni River as found now it has differentiated into a distinct subspecies. But for Day's account of it as 'as far south as Kottayam in Travancore' and Jenkins' record (1909) of it from Tenmalai and Kulattupuzha in Travancore, there have been no records of the species from Travancore, though based on the aforementioned works, some of the later writers have listed it as occurring there. The Travancore specimens of *arulius* (*vide* Mukerji's list) though not in a good state of preservation seem to be more or less identical with *P. arulius arulius* from the river Cauvery, thereby showing that the *forma typica* probably has a ranges extending from the Cauvery watershed to Central Travancore in the south, while the new subspecies, as far as known at present, is restricted to the Tambraparni watershed.

ACKNOWLEDGEMENT.

The writer is indebted to Dr. S. L. Hora, for going through the paper critically and for his helpful suggestions. He is also very thankful to his former Professor, Dr. J. P. Joshua, but for whose encouragement in the field, this collection would not have been possible. His sincere thanks are also due to Mr. P. I. Chacko, Fisheries Biologist, Madras Fisheries Department, for supplying him with two specimens of the new subspecies the dorsal fin of one of which is figured here.

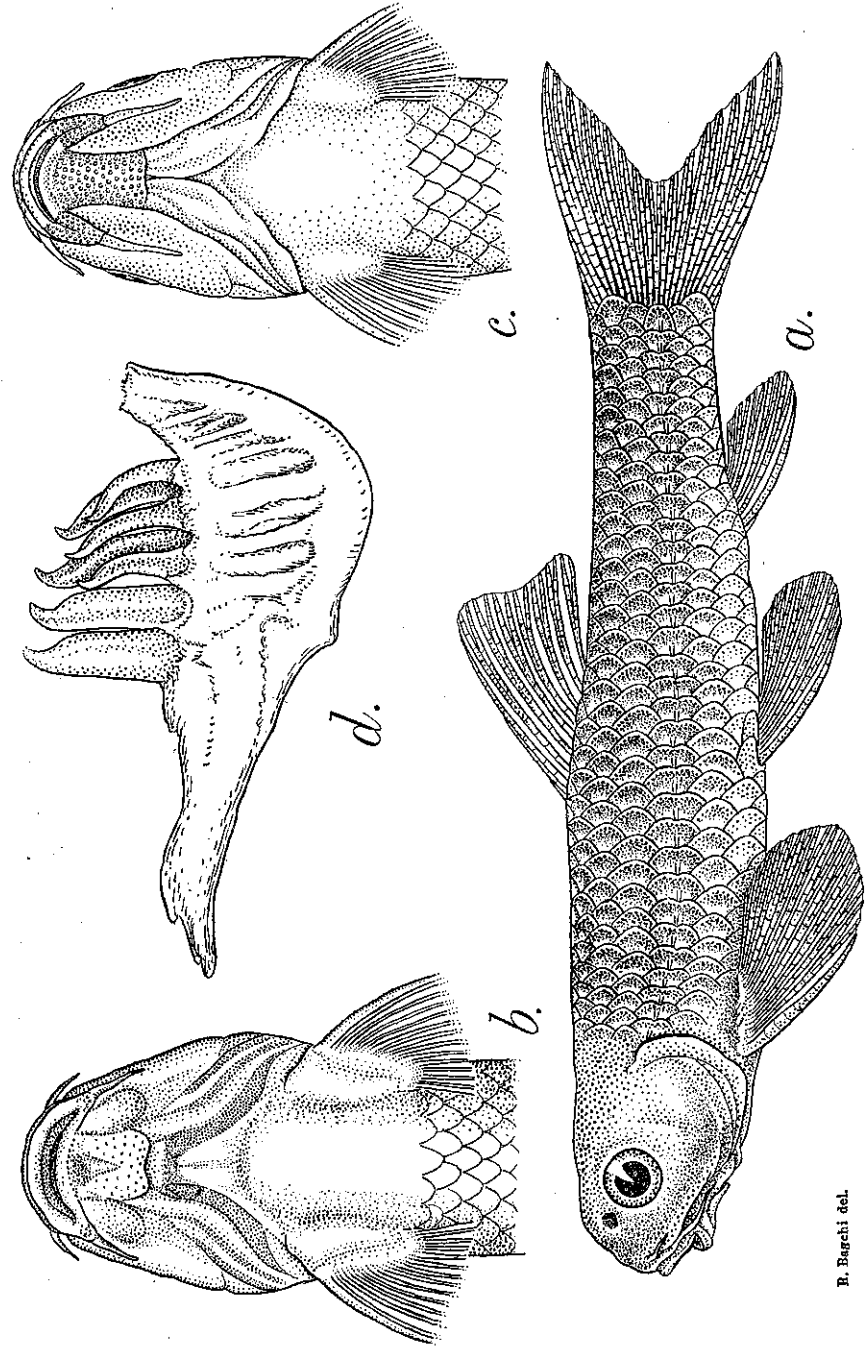
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EXPLANATION OF PLATE V.

Horabiosia joshuai gen. et sp. nov.

- a. Lateral view of Holotype measuring 53 mm. $\times 3$.
- b. Ventral view of head and anterior part of body of same $\times 4$.
- c. Ventral view of head and anterior part of body of a paratype measuring 40 mm. $\times 5\frac{1}{2}$.
- d. Pharyngeal teeth $\times 28$.



B. Bagchi del.

Horabiosia joshuai gen et sp. nov.